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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,185	01/26/2004	Akiyoshi Tafuku	1083.1099	6510
21171	7590	12/10/2007	EXAMINER	
STAAS & HALSEY LLP			CUNNINGHAM, GREGORY F	
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1201 NEW YORK AVENUE, N.W.			PAPER NUMBER	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/763,185

Applicant(s)

TAFUKU ET AL.

Examiner

Greg F. Cunningham

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-5,7-16,18 and 19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 3-5,7-14,16 and 19 is/are allowed.
- 6) ☒ Claim(s) 1,2,15 and 18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. This action is responsive to communications of application received 09/21/2007.
2. The disposition of the claims is as follows: claims 1-5, 7-16 and 18-19 are pending in the application. Claims 1, 3-5, 7-9, 15-16 and 18-19 are independent claims. Claims 6, 17 and 20 have been cancelled.

#### ***Claim Rejections - 35 USC § 103***

3. In view of amended claims and review of Applicant's comments, 103 rejections are withdrawn.

#### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 15 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Xiaoguang Lv Jie Zhou Chang-shui Zhang, "A Novel Algorithm for Rotated Human Face Detection", hereinafter Lv.

A. Lv discloses claim 1, "An apparatus for detecting orientation of a face [see 'oriented' and/or 'orientation' throughout document, along with Figs. 1a&b, 3 and 4] from image data acquired by photographing the face [see p. 3 at 'We apply the above framework to the face

libraries of MIT and our lab, all of which are real-life face images captured by CCD camera.'], the image data being composed of a plurality of pixel data aligned in horizontal direction and vertical direction [see 'pixel (x, y)' on p. 2 and 'pixel(s)' throughout the rest of the document, wherein 'x' corresponds to horizontal direction and 'y' corresponds to vertical direction], respectively, comprising:

a vertical adding section for adding the respective pixel data in the vertical direction of the image data [see histogram throughout document, for example, but not limited to p. 2 at 'In order to analyze the distribution of orientations, we develop a histogram, which is constructed by: {see equation (3)} where  $\alpha$  is the angle of any orientation between 0 and  $\pi$ ,  $g(x, y)$  is the anisotropic strength of pixel (x, y) whose orientation is  $\alpha$ . Wherein 'y' corresponds to "vertical direction" and summation sign  $\sum$  corresponds to "adding the respective pixel data in the vertical direction"]]; and

an orientation detecting section for detecting a face orientation based on a plurality of sum values calculated by said vertical adding section [see 'detection, detect, detectors, detecting, and detected' throughout document, and on p. 2 at 'For a rotated face, the orientation of principal axis represents the face rotation status with respect to upright situation. Suppose that the input window contains one face, then we can take three steps as follows:

1. Obtain the statistical orientation feature. For each pixel in the input window, the orientation  $\theta$  and anisotropic strength  $g$  are calculated respectively. In order to remove the influence of orientation brought by small gray scale difference between pixels (for example, in some smooth area, due to the quantization of gray scale, the pseudo orientation may occur.), we only consider the pixels whose gradient magnitude exceeds a threshold. In a circular window

mask the orientation histogram is generated. For real implementation,  $\alpha = \{0, bin, bin \times 2, \dots, \pi - bin\} \dots (5)$  where  $bin$  is the interval of two neighboring sampling orientation. The resolution of orientation can be adjusted by  $bin$ . The reason we use the circular window mask is to satisfy the isotropic computation.

2. Measure the symmetry of the histogram  $H(\alpha)$ . We investigate the symmetry of  $H(\alpha)$  with respect to any  $\alpha$ :  $\alpha = \{0, bin, bin \times 2, \dots, \pi - bin\} \dots (6)$

3. Determine the orientation of the principal axis.  $H(\alpha)$  is symmetric with respect to  $\beta$ , the orientation of the principal axis. So the symmetry measurement on the orientation of the principal axis results in a small value, may be the minimum one. Since orientations of the pixels in the oriented organs such as eyebrows and mouth are close to the orientation orthogonal to the principal axis, a local peak is generated at this orientation in the histogram  $H(\alpha)$ . So two measurements can be used — symmetry (nature in face) and peak (distribution of oriented pattern in face). Using both symmetry measure and local peak information, a criterion for determining the orientation of the principal axis is created as follows: (7) where  $h(\alpha)$  and  $sm(\alpha)$ , which range from 0 to 1, denote the normalized  $H(\alpha)$  and  $SM(\alpha)$ , respectively;  $w_1$  and  $w_2$  are weighting factors which control the relative importance of the  $h(\alpha)$  and  $sm(\alpha)$ . Then the orientation of the principal axis can be obtained, at which the maximum value of the  $OA(\alpha)$  is acquired. See Fig.2 for an illustration on finding the orientation of the principal axis.

### 3.3 Detecting with Upright Face Detector

With orientation of symmetry axis, We apply one classical upright-face detector proposed in [3] to detect the “derotated” window where a face is supposed to be contained.

So far, the rotated face is extracted.’

Furthermore on p. 3 at 'We apply the above framework to the face libraries of MIT and our lab, all of which are real-life face images captured by CCD camera. They include faces in different situations, such as in different lighting conditions, with beard or even with the glasses.

In our experiment, the rotated faces, which can not be extracted by conventional upright face detection systems, are tested. The results are rather satisfying and the exact orientation of the principal axis can be detected for over 98% of the images. Some of results are illustrated in Fig3. The *bin* of the histogram  $H(\alpha)$  is set to 6 degree. The weighting factor  $w_1$  in Eq.(7) is set to 0, and the  $w_2$  is set to 0.3. ']', supra [as detailed].

B. Per independent claims 15 and 18, these are directed to a method and computer memory product, respectively, for apparatus of independent claim 1, and therefore are rejected to independent claim 1.

C. Lv discloses claim 2, "The face orientation detection apparatus of claim 1, further comprising:

an extracting section for extracting characteristic data of a plurality of sum values calculated by said vertical adding section [see extracted throughout document, for example section 3.3 and Fig. 3]; and

a characteristic table storing the characteristic data in association with a plurality of face orientations [see 'bin', wherein corresponds with 'bin', for example p. 2 bottom of second column, and top the p. 3 second column],

wherein said orientation detecting section selects, from said characteristic table, a face orientation corresponding to the characteristic data extracted by said extracting section

[corresponds with p. 2, at ‘the resolution of orientation can be adjusted by bin’, wherein ‘bin’ corresponds to “table”]” supra for claim 1 and [as detailed].

*Allowable Subject Matter*

6. Claims 3-5, 7-14, 16 and 19 are allowed.
7. The following is a statement of reasons for the indication of allowable subject matter:

The closest related art, Kaneshiro Naoto (JP 00137788), hereinafter Naoto, provides for the face of the human is extracted from an image to be processed, the face candidate area is divided into a specific number of blocks (division patterns are shown by broken lines in (A)), and integral values of edge intensity in the top-bottom direction of the image are found, block by block. The feature quantities found for each block are collated with patterns for matching (cf. (B)) found by dividing the face area actually corresponding to the face of the human according to the division patterns and calculating edge intensity integral values for each block to evaluate the accuracy of the face candidate area as an area (face area) corresponding to the face of the human.

However, Naoto does not provide for “a horizontal adding section for adding the respective pixel data in the horizontal direction of the image data; an eye detecting section for detecting an eye position in the vertical direction based on a plurality of sum values calculated by said horizontal adding section; an eye vicinity adding section for adding the respective pixel data in the vertical direction in a vicinity region of the eye position detected by said eye detecting section; an orientation detecting section for detecting a face orientation based on a plurality of sum values calculated by said eye vicinity adding section” as claimed in independent claims 3-5, 16 and 19.

Nor does Naoto disclose in addition “a vertical adding section for adding the respective pixel data in the vertical direction of the image data; a variation calculating section for calculating a variation in the horizontal direction of the sum values calculated by said vertical adding section; and a specifying section for specifying a face outline in the horizontal direction based on the variation calculated by said variation calculating section, wherein said region detecting section detecting the face region based on the face outline specified by said specifying section” as claimed by independent claim 7. Nor disclose “pixel number storing section for storing a predetermined number of pixels; a horizontal adding section for adding the respective pixel data in the horizontal direction of the image data; an eye detecting section for detecting an eye position in the vertical direction based on a plurality of sum values calculated by said horizontal adding section; an under eye adding section for adding the pixel data in the vertical direction in a region located lower than the eye position detected by said eye detecting section by the number of pixels stored in said pixel number storing section; and a local minimum value specifying section for specifying a local minimum value of the sum values calculated by said under eye adding section, said nose detecting section detecting that a position in the horizontal direction of the sum value specified as the local minimum value by said local minimum value specifying section is the nose position” as claimed in independent claim 9.

Therefore as claimed by the combined elements of independent claims 3-5, 7-9, 16 and 19, the cited references and prior art of record lack separately and in combination the elements of said independent claims. Claims 10-14 depend from allowable independent claims 7-9 and therefore are also allowed.



***Responses***

8. Responses to this action should be mailed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231.

***Inquiries***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory F. Cunningham whose telephone number is (571) 272-7784.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Bella can be reached on (571) 272-7778. The Central FAX Number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).





Gregory F. Cunningham  
Examiner, Art Unit 2624

gfc

12/04/2007

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